What is claimed is:

1.   A method for manufacturing a glass optical element comprising steps of:

molding a glass material softened by heat with a molding device which comprises an upper mold having a molding surface and a lower mold having a molding surface so that optically functional surfaces are formed on the glass material by applying a molding pressure,

cooling the glass material so that the glass material obtains a predetermined viscosity,   and

removing the cooled glass material from the molding device,

wherein a temperature of the glass material is maintained, in the cooling step, within a range of (Tg+30) to (Tg-50) degree centigrade at least for a predetermined time, and a secondary pressure is applied to the glass material at least during the predetermined time, so that the strain in the glass material is reduced,

where Tg represents glass transition temperature of the glass.

2.   The method of Claim 1 wherein the secondary pressure is substantially continuously applied following the application of molding pressure and up to the removing.

3.   The method of Claim 2 wherein the secondary pressure is smaller than the molding pressure.

4.   The method of Claim 3 wherein the secondary pressure is set at pressure P1 before the beginning of the predetermined time and the secondary pressure is set at pressure P2 during the predetermined time, where P2 is greater than P1.

5.   The method of Claim 2 wherein temperature variation of the glass material of which temperature is maintained in the cooling step is 5 degree centigrade

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per minute or less.

6. The method of Claim 2 wherein temperature variation of the glass material of which temperature is maintained in the cooling step is substantially null.

7. The method of Claim 2 wherein, in the cooling step, the temperature of the glass material is maintained within a range of (Tg) to (Tg-50) degree centigrade at least for the predetermined time.

8. The method of Claim 3 wherein, in the cooling step, the temperature of the glass material is maintained within a range of (Tg) to (Tg-50) degree centigrade at least for the predetermined time.

9. The method of Claim 8 wherein, in the cooling step, the temperature of the glass material is maintained within a range of (Tg) to (Tg-20) degree centigrade at least for the predetermined time.

10. The method of Claim 2 wherein the secondary pressure is started to apply when a center thickness of the glass material is within ±0.2mm range of the glass optical element.

11. The method of Claim 3 wherein the molding pressure is within the range of 294×10^4 Pa to 3432×10^4 Pa, and the secondary pressure is within the range of 0.0098×10^4 Pa to 49×10^4 Pa.

12. The method of Claim 9 wherein temperature variation of the glass material of which temperature is maintained in the cooling step is 5 degree centigrade per minute or less.

13. The method of Claim 12 wherein the glass optical element comprises at least one concave surface.

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14. The method of Claim 13 wherein the glass optical element comprises one concave surface and one convex surface.

15. The method of Claim 14 wherein the convex surface comprises a spherical surface.

16. The method of Claim 13 wherein b/a is at least 1.5 where a represents a center thickness of the glass optical element and b represents a spherical thickness of the glass optical element.

17. The method of Claim 16 wherein the b/a is at least 2.

18. The method of Claim 2 wherein the predetermined time is determined by the following inequalities:

$$0 < t_1 \leqq 120(\text{sec}) \quad \text{when} \quad 1.5 \leqq b/a < 2.0,$$
$$20 < t_1 \leqq 180(\text{sec}) \quad \text{when} \quad 2.0 \leqq b/a < 2.5, \text{ and}$$
$$120(\text{sec}) < t_1 \quad \text{when} \quad 2.5 \leqq b/a,$$

where a represents a center thickness of the glass optical element

b represents a spherical thickness of the glass optical element,

and t_1 represents the predetermined time.

19. The method of Claim 18 wherein the predetermined time is determined by the following inequalities:

$$10 < t_1 \leqq 120(\text{sec}) \quad \text{when} \quad 1.5 \leqq b/a < 2.0,$$
$$20 < t_1 \leqq 180(\text{sec}) \quad \text{when} \quad 2.0 \leqq b/a < 2.5, \text{ and}$$
$$120(\text{sec}) < t_1 \quad \text{when} \quad 2.5 \leqq b/a.$$

20. The method of Claim 19 wherein the predetermined time is determined by the following inequalities:

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$$10 \; < \; t_1 \; \leqq \; 120(sec) \quad when \quad 1.5 \; \leqq \; b/a \; < 2.0,$$
$$60 \; < \; t_1 \; \leqq \; 180(sec) \quad when \quad 2.0 \; \leqq \; b/a \; < 2.5, \; and$$
$$120(sec) \; < \; t_1 \qquad\qquad when \quad 2.5 \; \leqq \; b/a.$$

21. The method of Claim 20 wherein the predetermined time is determined by the following inequality:

$$120(sec) \; < \; t_1 \; \leqq \; 350(sec) \qquad when \quad 2.5 \; \leqq \; b/a.$$

22. The method of Claim 3 wherein the glass material has two convex surfaces.

23. The method of Claim 12 wherein the predetermined time and the maintained temperature are determined so that the irregularity in an optically functional surface of the optical element is 0.8 fringes or less in Newton rings.

24. The method of Claim 10 wherein the secondary pressure is started to apply when a center thickness of the glass material is within ±0.03mm range of the glass optical element.

25. The method of Claim 23 wherein the predetermined time and the maintained temperature are determined so that the irregularity in an optically functional surface of the optical element is 0.5 fringes or less in Newton rings.